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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)

Masatoshi FUJIMOTO et al.)

Application No.: 10/076,273)

Filed: February 19, 2002)

For: RADIOISOTOPE GENERATING)
APPARATUS)

Group Art Unit: 3641

Examiner: J. Richardson

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Sir:

RESPONSE AND REQUEST FOR RECONSIDERATION
FILED WITH RCE UNDER 37 C.F.R. § 1.114

Concurrently filed herein with a Request for Continued Examination ("RCE"), and in
response to the Final Office Action dated March 7, 2003 (Paper No. 5), the period for response to
which extends through January 5, 2004 by the concurrently filed request for a two-month
extension of time and corresponding fee payment (a Notice of Appeal having been filed in this
application on September 5, 2003), reconsideration and withdrawal of the rejections set forth in
the outstanding Final Office Action are respectfully requested in light of the following remarks
and in light of the concurrently-filed Declaration under 37 C.F.R. § 1.132. 

Summary of the Office Action

In the Final Office Action, the specification remains objected to under 35 U.S.C. § 112, first paragraph, as allegedly failing to provide an adequate written description of the invention and as failing to adequately teach how to make and/or use the invention, i.e., allegedly failing to provide an enabling disclosure.

Claims 1 and 2 remain rejected under 35 U.S.C. § 101 because the disclosed invention is allegedly inoperative and therefore lacks utility.

Claims 1 and 2 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 1 and 2 stand rejected under 35 U.S.C. § 112, first paragraph, as allegedly containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Whittlesey (U.S. Patent No. 3,378,446) (hereinafter "Whittlesey").

Claim 1 stands rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Hedstrom (U.S. Patent No. 3,762,992) (hereinafter "Hedstrom").

Objections and Rejections under 35 U.S.C. §§ 112, First Paragraph and 101

The Final Office Action once again challenges the adequacy of the disclosure, despite the detailed arguments included in the Response and Request for Reconsideration filed on February 13, 2003 in this application.

At page 3, paragraph 5, the Final Office Action alleges that there “is still no reputable evidence of record to support the allegations or claims that the invention is capable of operating as indicated in the specification, that any allegations or claims of laser energy directed at a source material, item R, as described in the specification, page 10, lines 17+, as natural water, contains the necessary synthesis of for example, N-13, to produce the results depicted in the equations listed on pages 33, 34.”

Applicants respectfully traverse these assertions and submit that the present invention currently recited in claims 1 and 2 is fully described in the specification as originally filed, as discussed further below. Moreover, Applicants respectfully submit that the description in the specification as originally filed is sufficient to enable one skilled in the subject art to make and use the present invention, as recited in claims 1 and 2, for at least the following reasons.

The Final Office Action, at page 7 alleges that the instant “specification contains assumptions and speculation as to how in what manner, the invention will operate.” This portion of the Office Action goes on to allege that Applicants “[appear] to be basing the operativeness of [their] invention on various approximations, estimations, assumptions, etc., and therefore it is considered that the examiner has not been provided with an adequate response to the issues as set forth in Office action Paper No. 3, item 7.”

Applicants respectfully traverse this assertion in that in the Response filed on February 13, 2003, Applicants addressed in detail each of the particular portions of the specification cited

by the Examiner in the first Office Action (paper no. 3) at pages 4-6 to support these allegations. Further, Applicants will now address the Examiner's additional comments regarding each of these citations, as indicated at pages 3-6 of the Final Office Action, as follows.

Applicants wish to point out that throughout pages 3-6 of the Final Office Action, the Examiner notes that "to support this assertion the applicant directs the examiner to the specification" at particular pages. It is important that Applicants clarify the record in this regard in that each of these particular citations to the specification were originally pointed out not by Applicants but instead by the Examiner at pages 4-6 of the Office Action dated August 13, 2002 (paper no. 3). The Examiner cited to these portions of the specification as examples of the alleged "assumptions and speculation" found in the specification. Applicants' listing of these portions of the specification in the Response filed on February 13, 2003 (see items 1-9 at pages 4-10 of the Response) were merely included in an effort to reference, and respond to, each of the Examiner's original allegations regarding these examples of alleged "assumptions and speculation" point-by-point, as mentioned above, and discussed in further detail below.

1) Page 8, lines 2 to 5:

The Final Office Action, at page 3, lines 13-22, states that "[i]t appears to be the inventor's assertion is that the results of laser energy directed at sources of water will induce a nuclear reaction and result in the production of radioisotopes. To support this assertion the applicant directs the examiner to the specification, page 8, lines 2-5, and the applicant is attempting to **add** information that was not in the original disclosure, for example, **in order to effectively cause the reaction to occur, the intensity of the laser should be increased by narrowing the laser beam to as small a spot size as possible.**" The Office Action goes on to

note that "applicant cannot use a subsequent specification amendment to set forth subject matter in order to make the original specification more complete."

In response, Applicants note that it is important to clarify the record in that, as alluded to above, the reference to page 8, lines 2-5 was not made by Applicants in full support of the general assertion that "the results of laser energy directed at sources of water will induce a nuclear reaction and result in the production of radioisotopes" as asserted by the Final Office Action. Instead, the citation to page 8, lines 2-5 was originally made by the Examiner in the Office Action dated August 13, 2002. The Examiner had pointed to this portion of the specification as "stating that the nuclear reaction field is always small." The Examiner had originally used this citation as an example of how the disclosure of the instant application includes alleged "assumptions and speculation."

Applicants' citation to page 8, lines 2-5 was included in the Response filed on February 13, 2003 merely to reference the Examiner's original citation to this portion of the specification and to respond to the Examiner's allegation. In response to the Examiner's allegation in this regard, Applicants respectfully submitted that, as described in the specification, a region in which the described nuclear reaction occurs is very small. This means that in order to effectively cause the reaction to occur, the intensity of the laser should be increased by narrowing the laser beam to as small a spot size as possible.

With regard to the Examiner's assertion in the Final Office Action that Applicants are "attempting to **add** information that was not in the original disclosure, for example, **in order to effectively cause the reaction to occur, the intensity of the laser should be increased by narrowing the laser beam to as small a spot size as possible,**" Applicants respectfully submit that detailed descriptions of such laser beam convergence are supplied throughout the

specification, as originally filed, at least at page 9, lines 3-24 and page 30, lines 5-24, for example. This argument is further supported at least by item 13 of the concurrently-filed Declaration under 37 C.F.R. 1.132.

2) Page 9, lines 15, 16:

In the Office Action dated August 13, 2003 (paper no. 3), the Examiner originally pointed to this portion of the specification as "stating that whole or part of the optical laser system can be incorporated as the occasion demands without defining what such occasions may consist." The Examiner cited to this portion of the specification in support of his allegation that the specification included "assumptions and speculation."

Applicants provided a detailed traversal of this assertion in the Response filed on February 13, 2003, explaining that the provision of a transparent window in a high intensity light transmission path can sometimes cause a problem in that the window is destroyed when the intensity of the laser becomes too large. In such case, a system which does not incorporate such a transparent window in the transmission path should be used. In other words, the laser transmission path should be within a vacuum chamber in whole or in part in this situation. Applicants respectfully submitted that such an arrangement is commonly understood to those skilled in the subject art of treating high intensity lasers and that such concepts, accordingly, do not need to be further described in the instant specification.

The Final Office Action responds to this explanation by asserting that "the objection still stands in that applicant has not provided any evidence as to what or in what manner are such occasions defined or quantified."

Applicants respectfully traverse this objection once again because Applicants provided a

detailed example of such an occasion in the Response filed on February 13, 2003, as discussed above. Applicants explained that it is commonly understood to those skilled in the subject art that whole or part of the optical laser system can be incorporated as the occasion demands and gave an example of such regarding a transparent window not being compatible with a high intensity light transmission path. Moreover, Applicants respectfully submit that, even outside of the realm of those skilled in this art, it is merely common sense that when a laser is set to a high intensity, a window placed in the path of the laser beam may be shattered and should, accordingly, be removed from the laser path in such an instance. However, Applicants respectfully submit, nevertheless, that this "whole or part" concept is not currently explicitly recited in the claims.

3) Page 17 and page 18, lines 11+:

The Office Action (paper no. 3) pointed to this portion of page 17 of the specification as "stating that when water is the target material source, N-13 is produced and other materials such as nitric oxide, ammonia and nitrogen molecules adhere to copper surfaces." The Final Office Action alleges that "there is no evidence of record for making these assumptions."

In the Response filed on February 13, 2003, Applicants respectfully submitted that the laser used in an embodiment of the instant invention emits a light pulse having 200 mJ of energy and 30 fs of a pulse width has about 7 TW at an instantaneous maximum output. Such a large amount of energy can be realized as a result of recent developments in laser technology with comparative ease. Along the lines of the foregoing discussion, for example, when a spot size of the laser is narrowed to be about 10 μm at a converging point, the intensity of the laser at this converging point reaches to 10^{18} to 10^{19} W/cm².

Applicants respectfully submit that it is well-known to those skilled in the subject art that in such high intensity regions, a nuclear reaction can easily occur. The fact that D-T reactions are the only reaction type generally discussed is because the threshold of such a D-T nuclear reaction is low. As a result, D-T reactions are most effective as a reaction type for picking up energy therefrom. An object of the present invention, on the other hand, is to produce a useful radioactive isotope. As a result, a different reaction type is utilized in the present invention. Applicants respectfully submit that this other reaction type can also be utilized as a matter of course in accordance with the teachings in the disclosure of the instant application.

At page 4, lines 8-18 of the Final Office Action, the Examiner states that "in citing these sections of the original specification, the applicant has attempted to introduce new matter relating laser details, such as a) pulse width of 7.0TW at an instantaneous maximum output, b) spot size of laser narrowed to about 10 microns at a converging point, c) intensity of the laser at the converging point reaches 10 power 18 to 10 power 19 Watts/cm²."

In response, Applicants respectfully point out once again for clarification of the record that the Examiner appears not to understand that Applicants are merely referring to the portion of the specification which the Examiner first cited to at pages 4-6 of the Office Action dated August 13, 2003. In other words, the reference to page 17, page 18, lines 11+ was made by Applicants merely to refer and respond to a particular portion of the Examiner's original objection. In responding to the Examiner's allegations in this regard, Applicants have made no statement in any respect that its detailed explanation provided at page 5-6 of the Response filed on February 13, 2003 was supported only by page 17, page 18, lines 11+ of the specification.

Accordingly, Applicants traverse the Examiner's assertion regarding new matter as to these laser details. Applicants respectfully submit that the maximum output of about 7.0TW can

easily be arrived at by one having ordinary skill in the art by using the pulse energy value of 200 mJ and the pulse width of 30 fs, which are disclosed in the specification as originally filed at page 8, lines 9-10.

Moreover, Applicants respectfully submit that as for the laser spot size of about 10 μm , this value is merely an example that is a common value understood to those skilled in the art in an arrangement in which the subject laser beam is used in the converged state, as discussed in the above-cited portions of the specification. By assuming this spot size, the laser intensity at a focal point is obtained as 10^{18} to 10^{19} W/cm².

Applicants' response in this regard is further supported by item 14 in the concurrently-filed Declaration under 37 C.F.R. 1.132. Applicants note that lines 3-4 of item 14 of the Declaration refer to the Examiner's allegation that Applicants have attempted to add new matter by referring to a "pulse width of 7.0TW at an instantaneous maximum output." However, Applicants respectfully submit that the Examiner appears to have mistaken the original statement made by Applicants as included at page 5, lines 8-10 of the Response previously filed on February 13, 2003, that "the laser used in an embodiment of the instant invention emits a light pulse having 200 mJ of energy and 30 fs of a pulse width has about 7 TW at an instantaneous maximum output." In other words, Applicants have not referred to a "pulse width of 7.0TW," as alleged by the Office Action.

4) Lasers in Eye Surgery Issue

The Final Office Action, at pages 4-5 states that "[i]n response to Office action Paper No 3, page 4, first paragraph providing reference to the use of lasers in eye surgery without any evidence of the applicant's claimed nuclear reactions between lasers and water in the form of

vitreous humor present in the eye, the applicant uses arguments relating to methods of operation for the claimed invention which is an apparatus per se and can be considered as 'just sitting on a shelf' for the purposes of comparison to other similar types of equipment / apparatus." The Final Office Action goes on to state that "applicant states in Paper No. 4, page 6, line 10, that laser used in eye surgery do not (are incapable) produce any radio-active isotopes; the applicant has not provided any reportable evidence to substantiate this assertion."

Applicants respectfully respond to this argument by providing the Examiner with such "reportable evidence" by explaining that, as discussed in the specification, the apparatus disclosed in the instant application is able to generate and collect a radioisotope by application of a pulse laser light of high intensity peak power that results in a coulomb explosion of a cluster of a source material, such as natural water. Applicants respectfully submit that such conditions would never be used with a patient in an eye surgery environment because the high intensity laser would be very dangerous for contact with the vitreous humor present in the eye, for example. Moreover, Applicants respectfully submit that the water present in the eye in such a situation would not be in the required cluster state, nor would it be in the required vacuum environment, as disclosed in the specification.

5) Collecting of Only Necessary P-1 molecules

The Office Action (paper no. 3) cited to page 18, lines 11+ as "stating that collecting means are provided for discriminating and collecting only necessary P-1 molecules." The Office Action alleges that "[t]here is no evidence of record for making these assumptions." The Final Office Action alleges at page 5, lines 7-9 that "applicant has not addressed the issues raised in Office action, Paper No. 3, relating to original specification, page 18, lines 1+, relating to

collecting and discriminating means for **only P-1 molecules.**"

In response, Applicants respectfully submit that page 18, lines 11-20 of the specification describes that "the apparatus may also be preliminarily provided with a particle discriminator ... A discriminator utilizing a grid electrode, a quadrupole discriminating magnetic field, TOF, or the like is used as the particle discriminator." For example, Applicants respectfully submit that it is clear that by using the disclosed quadrupole magnetic field, the molecule discrimination with the value of (molecule mass)/(electric charge) can be performed by discriminating orbits of molecules, and selecting necessary P-1 molecules through the use of a mask placed at a specific position.

6) Page 18, lines 21+:

The Office Action dated August 13, 2002 pointed to this portion of the specification as "stating that a specific type and thickness of radiation shielding is provided without stating what are the controlling radionuclides in this respect." In response, Applicants respectfully submitted that, for example, the above described nuclear species is generated. However, in another reaction, an additional nuclear species is generated. Applicants respectfully submitted that the shielding method that is needed is dependent on the type of nuclear species generated, as a matter of course, and consistent with the general knowledge of those skilled in the subject art.

The Final Office Action alleges at page 5, lines 10-14 that "the applicant states that **nuclear species, and additional nuclear species are generated**, without providing any factual information on means for producing **any** nuclear species." In response, however, Applicants respectfully submit that, as described in the concurrently-filed Declaration under 37 C.F.R. § 1.132, nuclear reactions such as the $^{16}\text{O}(p, \alpha)^{13}\text{N}$ reaction occur in the disclosed apparatus, and

therefore the nuclear species are generated.

7) Page 22, lines 19+:

The Office Action dated August 13, 2002 pointed to this portion of the specification as “stating optimal molecule cluster size for inducing efficient nuclear reaction.” That Office Action then went on to state, however, that “[t]here is no basis provided for defining what is considered an efficient nuclear reaction, nor any basis for establishing the operating parameters for establishing the basis for optimal molecule cluster size.”

In response, Applicants respectfully submitted in the Response filed on February 13, 2003 that the specification discloses that the nuclear reaction occurs by the impact of nuclei forming a cluster in a process in which the nuclei fly in all directions at ultra high speed by a Coulomb explosion. Applicants explained that it is important in such nuclear reactions to make the laser energy absorption efficiency of the cluster as large as possible. Applicants respectfully submitted that it is well known by those having skill in the subject art that the energy absorption efficiency is large when the size of cluster approaches a wavelength of the laser.

In the Final Office Action, at page 5, lines 15-18 in this regard, the Examiner alleges that “the applicant has not provided any justification for” particular statements and terms in the specification such as “efficient nuclear reaction, operating parameters for establishing optimal molecular cluster size.” In the Office Action dated August 13, 2002, the Examiner states that there “is no basis provided for defining what is considered an efficient nuclear reaction.” In response, Applicants respectfully submit that it is clear that the “efficient” nuclear reaction is a nuclear reaction for producing the necessary nuclear species. Further, as for the operating parameters for establishing the basis for optimal molecular cluster size, the parameters are, for

example, a set temperature at the temperature setting section 24 (an electric current value supplied by a current source 24b etc.), a set pressure at the pressure setting section 26, and a set time while the electromagnetic shutter 28c of the source spray section 28 is open.

8) Page 24, lines 12+:

The Office Action dated August 13, 2002 pointed to this portion of the specification as “stating that a range of particles, such as alpha’s, neutrons, photons are generated by the alleged nuclear reaction, without providing evidence of the operating mechanisms for producing such charged particles.” In the Response filed on February 13, 2003, Applicants respectfully submitted in that, it is well known by those having skill in the subject art that such particles are generated when a nuclear reaction occurs. The specification describes various examples associated with the disclosed nuclear reactions.

The Final Office Action, at page 5-6 alleges that the Applicants’ response is “unsatisfactory” because it allegedly “merely resorted to general information relating to nuclear reactions.”

Applicants respectfully traverse this “unsatisfactory” allegation by asserting that in the Response filed on February 13, 2003, Applicants submitted that “it is well known by those having skill in the subject art that such particles are generated when a nuclear reaction occurs.” Moreover, Applicants went on to explain that the specification describes various examples associated with the disclosed nuclear reactions. Even further, at least item 15 of the concurrently-filed Declaration under 37 C.F.R. 1.132 supports these arguments.

9) Page 24, lines 17-24:

The Office Action dated August 13, 2002 pointed to this portion of the specification as

“stating that a monitoring and controlling means are required for example, for neutrons and photons, without defining what types and in what manner such monitoring and controlling operations are achieved.”

In the Response filed on February 13, 2003, Applicants respectfully submitted that because a detection method of detecting neutrons and γ rays is well known to those having skill in the subject art, the specification need not describe such detection methods in further detail.

The Final Office Action, at page 5-6 alleges that the Applicants' response is “unsatisfactory” because it allegedly “merely resorted to general information relating to nuclear reactions.”

Applicants respectfully traverse this “unsatisfactory” allegation by asserting that in the Response filed on February 13, 2003, Applicants submitted that “because a detection method of detecting neutrons and γ rays is well known to those having skill in the subject art, the specification need not describe such detection methods in further detail.”

10) Page 31, lines 8+:

The Office Action dated August 13, 2003 pointed to this portion of the specification as “stating that a time of one nanosecond is necessary for operating the applicant's device, without providing the theoretical basis for such a time period and without defining the means for achieving such time periods of operation.”

In the Response filed on February 13, 2003, Applicants respectfully submitted that it is well known to those having skill in the subject art that it takes up to about a nanosecond before the formation of a cluster of material ejected into vacuum space reaches an equilibrium state.

Moreover, Applicants submitted that because this is a process relating to the movement of

material, the required time does not decrease. Applicants explained that it is possible to introduce material before laser irradiation by synchronizing the introduction of the material with one prior pulse of laser. Applicants respectfully submitted that synchronizing in this way is a method that is well known to those having skill in the subject art, and therefore the Applicants respectfully submitted that the specification need not describe such a method in further detail.

The Final Office Action, at page 6, lines 3-9 alleges that "the applicant has attempted introduced new information not included in the original specification, such as **introducing material before laser irradiation by synchronizing, introducing of material with one prior pulse of the laser.**" Accordingly, the Examiner states that "[t]his response is considered to be unsatisfactory in addressing the concerns raised in Paper No. 4."

In response, Applicants respectfully submit that at least item 16 of the concurrently-filed Declaration under 37 C.F.R. § 1.132 addresses the Examiner's concerns in this regard.

11) Page 33, line 12, Page 35, lines 3 to 8:

The Office Action dated August 13, 2003 pointed to this portion of the specification as "introducing a series of nuclear reaction equations without providing any basis for claiming that the applicant's invention can result in such nuclear reactions."

In the Response filed on February 13, 2003, Applicants respectfully submitted that it appears that the Office Action intended to refer to page 34, lines 3 to 8 instead of page 35, lines 3 to 8. Nevertheless, Applicants respectfully submitted that such a nuclear reaction is well known to those having skill in the subject art associated with nuclear accelerating device experimentation. Further, as described in the specification and in the foregoing discussion, Applicants respectfully submitted that such a nuclear action does result from the concepts

associated with the present invention, as described in the specification and recited in claims 1 and 2.

In response, the Final Office Action, at page 6, lines 10-18 alleges that "the applicant argues that **nuclear accelerating device experimentation** is the justification for the claimed nuclear reactions." The Final Office Action goes on to state that it "is the examiner's position that a) **nuclear accelerating device experimentation** is not mentioned in the original specification, and b) the applicant's assertion that the **concept** statements contained in claim 1 is an inadequate basis for justifying the claimed nuclear reactions."

Applicants respectfully respond to this assertion by stating that Applicants' use of the term "nuclear accelerating device experimentation" was merely used to define the field of art of the person having ordinary skill. To the extent that the Examiner believes that such a reference is not acceptable, Applicants respectfully rephrase their submission as "such a nuclear reaction is well known to those having skill in the subject art associated with nuclear reactions," for example.

12) Rejection of Claims 1 and 2 under 35 U.S.C. § 101

In the rejection of claims 1 and 2 under 35 U.S.C. § 101 at pages 7-8 of the Final Office Action, the Examiner states that "[t]here is no reputable evidence of record to indicate the invention has been reduced to the point of providing in current available form, an operative nuclear fusion device based on directing an optical laser light at a water source in a vacuum vessel produce radioisotopes." The Final Office Action goes on to assert that the "applicant at best, has set forth what may be considered a concept or an object of scientific research.

However, it has been held that such does not represent a utility with the meaning of 35 USC

101.” Even further, the Final Office Action goes on to assert that because the utility of the claimed invention is “based on allegations that border on the incredible or allegations that would not be readily accepted by a substantial portion of the scientific community” then “sufficient substantiating evidence of operability must be submitted by the applicant.”

In response, Applicants respectfully point out that MPEP § 2107.01 sets forth that “[s]ituations where an invention is found to be ‘inoperative’ and therefore lacking in utility are rare, and rejections maintained solely on this ground by a Federal court even rarer.” Moreover, MPEP § 2107.02 goes on to instruct that “[i]n most cases, an applicant’s assertion of utility creates a presumption of utility that will be sufficient to satisfy the utility requirement of 35 U.S.C. 101.” Applicants have explained the utility and operativeness of their invention throughout the disclosure, as originally filed, and as explained in the foregoing discussions.

Moreover, with regard to the Final Office Action’s concerns regarding “sufficient substantiating evidence of operability,” at least items 7-14 in the concurrently-filed Declaration under 37 C.F.R. § 1.132 support the disclosure in the specification as originally filed. In particular, the Declaration supports the specification’s teaching of an operative nuclear fusion device based on directing an optical laser light at a water source in a vacuum vessel to produce radioisotopes. Moreover, the possibility of realizing an $^{16}\text{O}(p, \alpha) ^{13}\text{N}$ reaction by using a laser is evidenced by the teachings of the D3 document to Spencer et al., as described in items 7 and 9 of the concurrently-filed Declaration under 37 C.F.R. § 1.132.

13) Rejections of Claims 1 and 2 under 35 U.S.C. § 112, First Paragraph

In the rejections of claims 1 and 2 under 35 U.S.C. § 112, first paragraph at pages 8-9 of the Final Office Action, the Examiner states that the Applicants’ arguments set forth at page 3 of

the Response are not persuasive in that "referring to claim 1 there is no proper support in the original disclosure for claimed nuclear reaction based on source materials disclosed (natural water) for using a laser optical system as the irradiating means." Moreover, the Final Office Action states that it "is the examiner's opinion that the cited sections of the specification merely state that **it is feasible to bring about a nuclear reaction** without providing any practical evidence to support this alleged **feasibility** of a nuclear reaction."

Applicants respectfully traverse these allegations by referring to MPEP § 2164.01, which sets forth a test of enablement as "[a]ny analysis of whether a particular claim is supported by the disclosure in an application requires a determination of whether that disclosure, when filed, contained sufficient information regarding the subject matter of the claims as to enable one skilled in the pertinent art to make and use the claimed invention." Moreover, MPEP § 2164.08 goes on to state that "[t]he Federal Circuit has repeatedly held that 'the specification must teach those skilled in the art how to make and use the full scope of the claimed invention without 'undue experimentation'." *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed.Cir. 1993). Nevertheless, not everything necessary to practice the invention need be disclosed. In fact, what is well-known is best omitted. *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991). All that is necessary is that one skilled in the art be able to practice the claimed invention, given the level of knowledge and skill in the art."

Moreover, with regard to the Final Office Action's concerns regarding "practical evidence to support the alleged feasibility of a nuclear reaction," at least items 7-14 in the concurrently-filed Declaration under 37 C.F.R. § 1.132 support the disclosure in the specification as originally filed. In particular, the Declaration supports the specification's teaching of an operative nuclear fusion device based on directing an optical laser light at a water source in a

vacuum vessel to produce radioisotopes. Moreover, the possibility of realizing an $^{16}\text{O}(p, \alpha) ^{13}\text{N}$ reaction by using a laser is evidenced by the teachings of the D3 document to Spencer et al., as described in items 7 and 9 of the Declaration under 37 C.F.R. § 1.132.

Rejections under 35 U.S.C. § 102(b)

Claims 1 and 2 remain rejected under 35 U.S.C. § 102(b) as being anticipated by Whittlesey. Claim 1 remains rejected under 35 U.S.C. § 102(b) as being anticipated by Hedstrom.

In the previous Response filed on February 13, 2003, Applicants respectfully submitted that Whittlesey relates to technology in which material including deuterium or tritium is introduced into a vacuum space as a drop, and the vacuum space is subsequently irradiated with a laser to generate a very high temperature region therein to result in the occurrence of a D-T nuclear reaction. Applicants submitted that Whittlesey focuses its disclosure only to a specific energy that is generated by the D-T nuclear reaction, and it does not disclose nor suggest the utility of a reaction product that might be generated by other nuclear reactions including a collection arrangement, as recited in the claims of the instant application.

More particularly, Applicants submitted that the present invention, as recited in claim 1, differs from the arrangement in Whittlesey, for example, in that a principle for obtaining motion energy for causing a nuclear reaction to occur in some material in accordance with the instant invention is based on a Coulomb explosion of a cluster. As a result, it is not necessary to use a plurality of laser irradiations, as in the Whittlesey arrangement. Additionally, in order to utilize the reaction product generated by nuclear reaction in the instant invention, the radioisotope

generation apparatus combination recited in claim 1 includes a collecting section that collects the reaction product. Applicants asserted that such arrangements are neither shown, nor even suggested, by Whittlesey.

In the Response filed on February 13, 2003, Applicants also respectfully submitted that Hedstrom relates to technology in which a pellet, having material including deuterium or tritium inserted into it, is introduced into a vacuum space. The vacuum space is then irradiated with a laser to generate a very high temperature region therein so that a D-T nuclear reaction occurs. More particularly, Applicants explained that Hedstrom discloses how to collect generation energy emitted as a motion energy of a neutron. Hedstrom's specification describes technology for effectively picking up energy by utilizing a reaction between a generated neutron and lithium and for performing reproduction of tritium needed as a material.

Applicants respectfully submitted that the distinctions discussed above between the instant invention and Whittlesey can also be applied to a traversal of the rejection involving the Hedstrom reference. In Hedstrom, an arrangement which utilizes tritium, a reaction product of lithium and a neutron, is described. However, Applicants respectfully submitted that Hedstrom does not teach or suggest disclose a method or arrangement for collecting this reaction product. In the Hedstrom arrangement, the separation of tritium from lithium could be performed by any known means at a later time due to the long half life period of tritium. On the contrary, the arrangement of the present invention, as recited in claim 1, is directed to an arrangement involving the rapid collecting of the reaction product after the subject nuclear reaction. It is apparent that the arrangement recited in the instant application is an indispensable technology in particular when the reaction product has a short half life period.

In the Final Office Action, at pages 10-12, the Examiner alleges that the "applicant

appears to be basing arguments comparing **operating methods and processes** rather than whether the **apparatus** disclosed in the reference is capable of functioning and operating in the manner claimed." Applicants respectfully traverse this assertion in that Applicants have specifically pointed to the "product nucleus collecting section for collecting a molecule having a nucleus of the radioisotope generated in said nuclear reaction section" recitation of claim 1 and stated that neither Whittlesey nor Hedstrom teaches or suggests such a "collection section".

With regard to the Examiner's assertions regarding Applicant's apparent arguments based on operating methods and processes, these distinctions were made to explain the different purposes and objects discussed in the applied references, as compared to those of the instant invention. In general, the applied references are directed to low threshold D-T nuclear reactions having an overall purpose of generating energy. On the other hand, the arrangement of the instant invention is involved with the collection of a useful radioactive isotope from a high-threshold nuclear reaction. In other words, these distinctions were provided to explain in part why the applied references do not teach or suggest the "product nucleus collecting section" recited in the claims, namely because they are each directed to reactions that do not involve the collection of a molecule having a radioisotope nucleus.

Accordingly, Applicants respectfully assert that the rejections under 35 U.S.C. § 102(b) should be withdrawn because Whittlesey and Hedstrom, taken separately, do not teach or suggest each feature of independent claim 1. As pointed out in MPEP § 2131, "[t]o anticipate a claim, the reference must teach every element of the claim." Thus, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. v. Union Oil Co. Of California, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987)." Furthermore, Applicants respectfully assert that dependent claim 2 is